

‘The Gc Ms Analysis Of Ethyl Acetate Extract Of One Herbal Plant, ‘Justicia Glauca’

Hassan Mohammad M¹, Kanagasabai V², Nandini M S³, Prabhu K⁴, Rao M R K^{5*}, Kalaivannan J⁶, Janaki CS⁷

¹Lecturer, Department of Anatomy, Faculty of Medicine, Northern Borders University, Arar, Saudi Arabia.

²Vice Chancellor, Bharath Institute of Higher Education And Research Bharath University, Chennai, India

³Assistant Professor, Department of Microbiology, SreeBalaji Medical College and Hospital, Chennai, Tamil Nadu, India

⁴Associate Professor, Department of Anatomy, SreeBalaji Medical College and Hospital, Chennai, Tamil Nadu, India

⁵ Consultant Scientist, M/s. Noahs Laboratories, No, 8/1, Old Mahabalipuram Road, Thiruporur, Tamil Nadu 603110, India.

⁶Associate Professor, Department Of Anatomy, Vinayaka Mission’s Medical College And Hospital, Karikal, Vinayaka Mission’s Research Foundation, Salem, Tamil Nadu, India.

⁷Associate Professor, Department of Anatomy, Bhaarith Medical College, Chennai, Tamil Nadu, India

ABSTRACT

The present study deals with the GC MS analysis of one medicinal plant, *Justicia glauca*. Not much work was done on this species although all the species of *Justicia* genus have important ethno-medical use. The plant was collected from nearby hills of Chengalpattu, Tamilnadu. The ethyl acetate extract of the aerial parts of the plant was subjected to GC MS study following standard protocols. It was observed that some very important molecules such as n-Hexadecanoic acid, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Squalene, Sulfurous acid, butyl heptadecyl ester, .gamma.-Tocopherol, Pregnenolone, 17.alpha.-Hydroxypregnenolone, Stigmasterol, .beta.-Sitosterol, Z,E-2,13-Octadecadien-1-ol, .beta.-Amyrin, Lupeol. Further work is warranted in this regard. These molecules play a vital role in the medicinal role of *Justicia glauca*.

Key Words GC MS, *Justicia glauca*, n-Hexadecanoic acid, Stigmasterol, .beta.-Sitosterol, .beta.-Amyrin, Lupeol

INTRODUCTION

Justicia genus has a number of species which have great medicinal roles. *Justicia adhatoda* is one plant which has maximum ethno-medicinal value. Only scanty reports are available on the medicinal

roles of other related species of this genus. The phytochemical and analysis and antibacterial activity of *Justiciaglaucawas* reported by Bheemaganiet al, 2015. The antibacterial role of the gold nanoparticles of *Justiciaglauca* was studied by Emmanuel et al, 2017. Kavitha et al, 2014 have reviewed the phytochemical and pharmacological potential of a related species, *Justiciagendarussa*. The present work reports the GC MS pattern of the ethyl acetate extracts of *Justiciagaluca* whole plant. This is in continuation of our endeavour to establish the medicinal efficacy of the herbal and traditional systems of Ayurveda, Sidhha and Unani systems of medicine (Priyadarshiniet al, 2017; Jayakumariet al, 2017; Rao et al, 2018; Vijayalakshmi and Rao, 2019; Yuvaraj et al, 2019; Mutteviet al, 2019, Rao et al, 2019; Mutteviet al, 2020; Vijayalakshmi and Rao, 2020; Janakiet al, 2021, Perumalet al, 2021).

MATERIALS AND METHODS

The plant *Justiciaglaucawas* collected from the nearby hills at Chengalpattu, Tamil Nadu. The plant was identified by a qualified botanist at Chennai. The ethyl acetate extract of the shade dried whole plant was collected after 48 h of soaking. The extract was evaporated and the dried powder was used for GC-MS analysis by standard procedures.

GC-MS Procedure

Instrument: GC (Agilent: GC: (G3440A) 7890A. MS/MS: 7000 Triple Quad GCMS) was equipped with MS detector.

Sample Preparation

About 100 ml sample was dissolved in 1 ml of suitable solvents. The solution was stirred vigorously using vortex stirrer for 10 s. The clear extract was determined using GC for analysis.

GC-MS Protocol

Column DB5 MS (30 mm × 0.25 mm ID × 0.25 µm, composed of 5% phenyl 95% methylpolysiloxane), electron impact mode at 70 eV; helium (99.999%) was used as carrier gas at a constant flow of 1 ml/min injector temperature 280°C; auxiliary temperature: 290°C ion-source temperature 280°C.

The oven temperature was programmed from 50°C (isothermal for 1.0 min), with an increase of 40°C/min, to 170°C C (isothermal for 4.0 min), then 10°C/min to 310°C (isothermal for 10 min) fragments from 45 to 450 Da. Total GC running time is 32.02 min. The compounds are identified by GC-MS Library (NIST and WILEY).

RESULTS AND DISCUSSION

The results of the GC-MS analysis of the whole plant ethyl acetate extract, along with the possible medicinal role of each molecule of *Justiciaglauca* extract are tabulated in Table 1. Figure 1 represents the GC-MS profile of ethyl acetate extract of the whole plant of *Justiciaglauca*. The identification of metabolites was accomplished by comparison of retention time and fragmentation pattern with mass spectra in the NIST spectral library stored in the computer software (version 1.10 beta, Shimadzu) of the GC-MS along with the possible pharmaceutical roles of each bio molecule as per Dr. Duke's Phytochemical and ethno-botanical data base (National Agriculture Library, USA) and others as shown in Table 1. Table no. 1 indicates the presence of a wide range of molecules having important medicinal roles, such as n-Hexadecanoic acid, 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, 2-((Octan-2-yloxy)carbonyl)benzoic acid, Squalene, Sulfurous acid, butyl heptadecyl ester, .gamma.-Tocopherol, Pregnenolone, 17.alpha.-Hydroxypregnenolone, Stigmasterol, .beta.-Sitosterol, Z,E-2,13-Octadecadien-1-ol, .beta.-Amyrin, Lupeol. Further work is warranted in this regard.

CONCLUSION

It is concluded that the types of medicinal values the molecules have, as is shown in the Table, *Justiciaglauca* can prove itself as an important medicinal plant.

ACKNOWLEDGMENTS

The authors express their sincere thanks to all who have helped in this project.

REFERENCES

1. Bheemagani, A. J., Pullagummi, C., Bhalundra, H. S. S., Rao, N. B., Anupalli, R. R. (2015) Phytochemical analysis and antibacterial activity of *Justiciaglauca* Rottker. *Int J of Pharm Bio Sci*, 6(1): 409-415
2. Kavitha, K., Sangeetha, K.S. S., Sujatha, K., Umamaheswari, S. (2014) Phytochemical and Pharmacological Profile of *Justiciagendarussa* Burm f. – review. *Journal of Pharmacy Research*, 8(7), 990-997
3. Emmanuel, R., Saravanan, M., Ovais, M., Padmavathy, S., et al. (2017) Antimicrobial efficacy of drug bisynthesised colloidal gold nanoparticles from *Justiciaglauca* against oral pathogens: A nanobiotic approach. *Micro Patho*, 113, 295-302
4. Muttevi Hyagreva Kumar, Prabhu K, Mudiganti Ram Krishna Rao, Lakshmisundram R, Sampad Shil, Sathish Kumar M, Vijayalakshmi N. (2020) The GC MS study of one medicinal plant, *Aristolochia indica*. *DIT*, 12(12), 2919-2923.

5. GomathiPriyadarshini, Arul Amutha Elizabeth, Jacintha Anthony, Mudiganti Ram Krishna Rao, Prabhu. K., Aiswarya Ramesh, Vani Krishna. (2017) The GC MS analysis of one medicinal plant, *Premnatomentosa*. Journal of Pharmaceutical Sciences and Research, **9(9)**, 1595-1597
6. Jayakumari, S., Prabhu, K., Mudiganti Ram Krishna Rao, Bhupesh, G., Kumaran, D., Aishwariya Ramesh. (2017) The GC MS Analysis of a Rare Medicinal Plant *Aloe barbadensis*. J. Pharm. Sci. & Res. **9(7)**, 1035-1037
7. Rao, M. R. K., Vijayalakshmi, N. (2018) Preliminary phytochemical and GC MS analysis of different extracts of *Sphaeranthus indicus* leaves. Indo American J of Pharmaceuical Sciences, **5(3)**, 1511-1520
8. Vijayalakshmi, N., Mudiganti Ram Krishna Rao. (2019) The antioxidant studies of two medicinal plants, *Sphaeranthus indicus* and *Psophocarpus tetragonolobus*. Asian J of pharmaceutical and Clinical Res, **12(1)**, 321-327.
9. Yuvaraj, R., Mudiganti Ram Krishna Rao, Prabhu, K., Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N. (2019) The GC MS study of one medicinal plant, *Stachytarpheta indica*. Drug Invention Today, **12(9)**, 1665-1669
10. Muttevi Hyageva Kumar, Prabhu, K., Mudiganti Ram Krishna Rao, Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N. (2019) The GC MS study of one medicinal plant, *Dodonaea angustifolia*. Drug Invention Today, **12(9)**, 1661-1664
11. Mudiganti Ram Krishna Rao, Vijayalakshmi, N., Prabhu, K., Sathish Kumar, M. (2019) The gas chromatography–mass spectrometry study of *Moringa oleifera* seeds. DIT, **12(10)**, 2172-2175
12. Muttevi Hyageva Kumar, Prabhu, K., Mudiganti Ram Krishna Rao, Lakshmisundram, R., SampadShil, Sathish Kumar, M., Vijayalakshmi, N. (2020) The GC MS study of one medicinal plant, *Aristolochia indica*. DIT, **12(12)**, 2919-2923.
13. Vijayalakshmi, N., Mudiganti Ram Krishna Rao. (2020) 'Preliminary phytochemical and antioxidant studies of leaf extracts of one medicinal plant, *Vitex negundo*'. RJPT, **13(5)**, 2167-2173
14. Janaki C. S., Prabhu K., Mudiganti Ram Krishna Rao, Venkat Ramaiah, Shruti Dinkar, Vijayalakshmi, N., Kalaivannan. J. (2021) The GC MS analysis of Ethyl acetate extract of *Merremia emerginata*. Ind J of Natural Sciences, **12(67)**, 33638-33646
15. Perumal, G. M., Prabhu, K., Rao, M. R. K., Janaki, C. S., Kalaivannan, J., Kavimani, M. (2021) The GC MS analysis of Ethyl acetate extract of *Flueggea leucopyrus*. Nat. Volatiles & Essential Oils, **8(5)**, 4035-4040

16. Dr.Duke's Phytochemical and Ethnobotanical Databases.U.S. Department of Agriculture, Agricultural Research Service.1992-2016. Dr. Duke's Phytochemical and Ethnobotanical Databases. Home Page, <http://phytochem.nal.usda.gov/> <http://dx.doi.org/10.15482/USDA.ADC/1239279>

Figure 1. Represents the GC MS graph of ethyl acetate extract Justiciaglauca'.

Qualitative Compound Report

Data File 280121038.D Sample Name Justicia glauca
Sample Type Position 125
Acq Method GC Screening New Method.M Acquired Time 31-01-2021 AM02:36:53
Comment

User Chromatogram

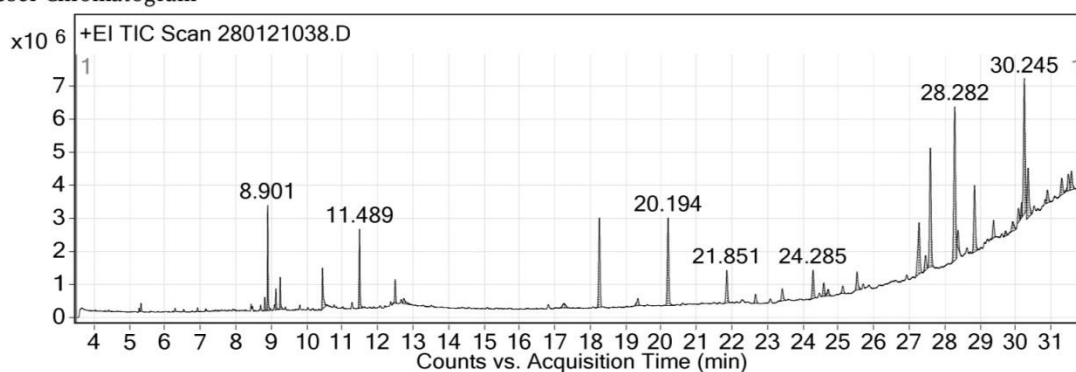


Table 1. Indicates the retentions time, types of possible compound, molecular formula, molecular mass, percentage peak area and the possible medicinal roles of each compound as shown in the GC MS profile ofJusticiaglauca'.

| Ret. Time | Compound | Mol. Formula | Mol. Mass | % Peak Area | Possible Medicinal Role |
|-----------|---|--------------|-----------|-------------|---|
| 8.90 | Bicyclo[3.1.1]heptane, 2,6,6-trimethyl- | C10H18 | 138.1 | 4.18 | Not Known |
| 9.25 | 9-Octadecyne | C18H34 | 250.3 | 1.27 | Not Known |
| 10.45 | n-Hexadecanoic acid | C16H32O 2 | 256.2 | 2.57 | Acidifier, Arachidonic acid Inhibitor, Increases Aromatic Amino acid decarboxylase activity, Inhibits production of uric acid, Urine acidifier, |

| | | | | | |
|-------|--|-----------|-------|------|--|
| | | | | | Anaphylactic, Arylamine N acetyltransferase inhibitor, decreases norepinephrine production, Down regulates nuclear and cytosol androgen reuptake, GABA-nergic, Increase NK cell activity, inhibits production of tumor necrosis factor, Myo-neuro-stimulator |
| 11.49 | Cyclohexanol, 5-methyl-2-(1-methylethyl)-, (1.alpha.,2.beta.,5.alpha.)-(./-.)- | C10H20O | 156.2 | 3.98 | Not Known |
| 12.50 | 3,7,11,15-Tetramethyl-2-hexadecen-1-ol | C20H40O | 296.3 | 1.29 | Oligosaccharide Provider |
| 18.26 | 2-((Octan-2-ylloxy)carbonyl)benzoic acid | C16H22O4 | 278.2 | 6.61 | Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase activity |
| 20.19 | Squalene | C30H50 | 410.4 | 7.01 | Monooxygenase inhibitor, biochemical precursor in the preparation of steroids, natural moisturizer, used in cosmetics |
| 21.85 | Sulfurous acid, butyl heptadecyl ester | C21H44O3S | 376.3 | 2.69 | Acidifier, Arachidonic acid inhibitor, Increases Aromatic Amino acid Decarboxylase |

| | | | | | activity |
|-------|--|---------------|-------|-------|---|
| 23.42 | 1-Nonylcycloheptane | C16H32 | 224.3 | 1.13 | Not known |
| 24.59 | Octacosyl acetate | C30H60O 2 | 452.5 | 1.17 | Not known |
| 24.71 | .gamma.-Tocopherol | C28H48O 2 | 416.4 | 0.71 | Tocopherol synergist, PPAR-gamma antagonist |
| 25.53 | 4,5,6,7-Tetrahydro- benzo[c]thiophene-1- carboxylic acid allylamide | C12H15N OS | 221.1 | 1.64 | Not known |
| 27.27 | Pregnenolone | C21H32O 2 | 316.2 | 5.83 | Helps relieve fatigue and provides energy, enhances memory; trauma and improves immunity, used for skin disorders including psoriasis and scleroderma. |
| 27.46 | 17.alpha.- Hydroxypregnenolone | C21H32O 3 | 332.2 | 1.44 | 5 alpha reductase inhibitor, HIF1 alpha inhibitor, Alpha amylase inhibitor, IkappaB- alpha phosphorylation inhibitor, Interlukine- 1 alpha inhibitor, Testosterone 5 alpha reductase inhibitor, alpha agonist, alpha amylase inhibitor, alpha glucoside inhibitor, increases alpha Mannosidase activity, TNF alpha inhibitor |
| 27.59 | Stigmasterol | C29H48O | 412.4 | 11.90 | Precursor of progesterone , acts as intermediate in the biosynthesis of androgens and estrogens, anti- osteoarthritic, |

| | | | | | |
|-------|----------------------------|---------|-------|-------|---|
| | | | | | antihypercholesterolemic, cytotoxic, antitumor, hypoglycemic, antimutagenic, antioxidant, anti-inflammatory, analgesic |
| 28.28 | .beta.-Sitosterol | C29H50O | 414.4 | 14.53 | 17 beta dehydrogenase inhibitor, androgen blocker, anti-amyloid beta, anticancer, Anti TGF beta, Beta 2- receptor, beta blocker, beta-galactosidase inhibitor, beta-glucuronidase inhibitor |
| 28.37 | Z,E-2,13-Octadecadien-1-ol | C18H34O | 266.3 | 1.30 | Increases Zinc bioavailability, provides zinc, anticancer, antidote, antitumor, Cytochrome-P450-2E1-Inhibitor, Decreases C-Teleopeptide Excretion, Decreases Deoxypyridinoline Excretion, Decreases Endothelial Leukocyte Adhesion, Decreases Epinephrine Production, Decreases Oxalate Excretion |
| 29.38 | .beta.-Amyrin | C30H50O | 426.4 | 1.38 | 17 beta hydroxysteroid dehydrogenase inhibitor, Anti-amyloid beta, Anti TGF beta, Beta receptor agonist, Beta adrenergic receptor blocker, beta blocker, beta galactosidase inhibitor, beta |

| | | | | | |
|-------|---|---------|-------|-------|---|
| | | | | | glucuronidase inhibitor, ER beta binder |
| 30.08 | 2-[4-methyl-6-(2,6,6-trimethylcyclohex-1-enyl)hexa-1,3,5-trienyl]cyclohex-1-en-1-carboxaldehyde | C23H32O | 324.2 | 1.06 | NotKnown |
| 30.25 | Lupeol | C30H50O | 426.4 | 12.37 | Anti-inflammatory, anti-arthritic, anti-mutagenic and anti-malarial |